University of Mumbai

Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **Bachelor of Engineering**

Curriculum Scheme: **Electronics & Telecommunication (Rev2019 'C' Scheme)**

Examination: **DSE** Semester **III**

Course Code: **ECC304** and Course Name: **Network Theory**

Time: 2 hour Max. Marks: 80

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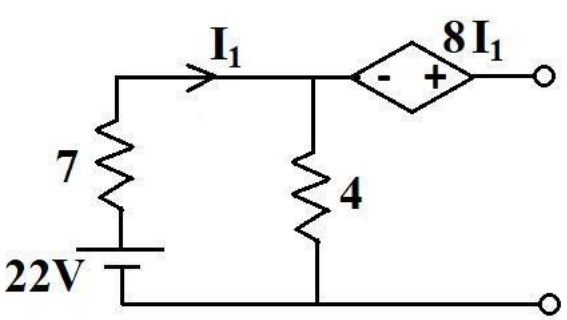
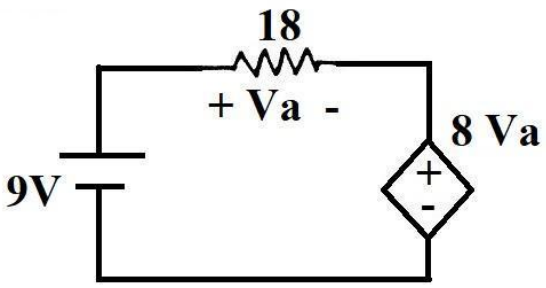
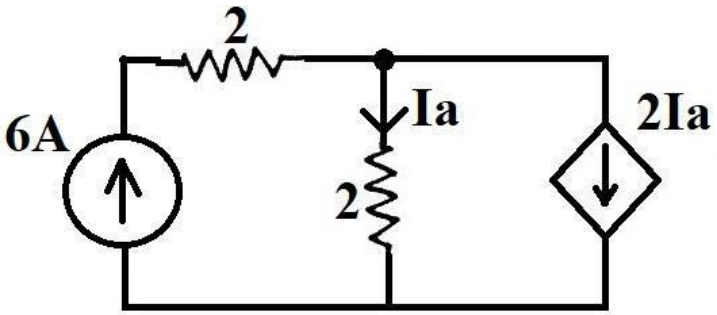
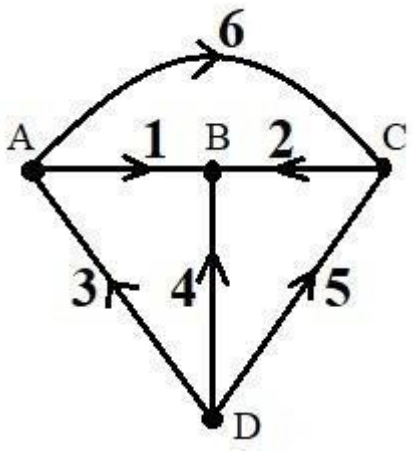
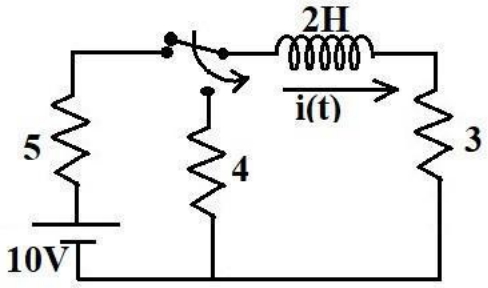
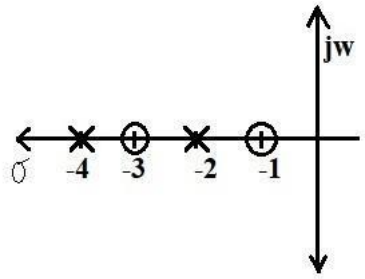
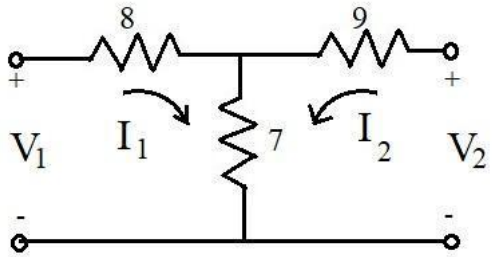
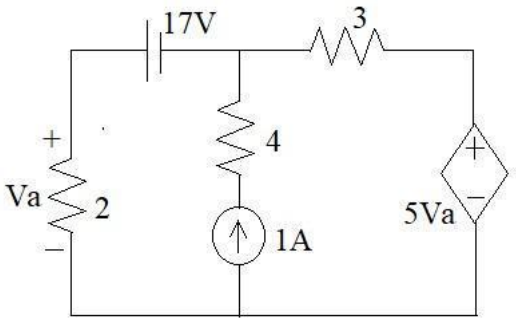
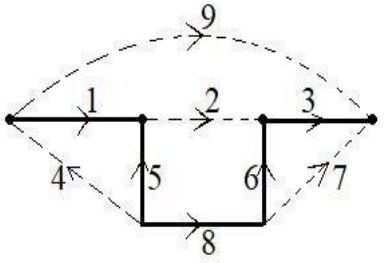
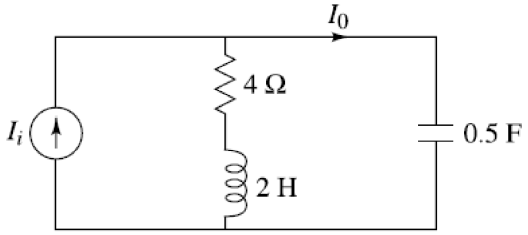
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	Which of the following conditions delivers maximum power to the load?
Option A:	$R_L > R_{TH}$
Option B:	$R_L = R_{TH}$
Option C:	$R_L < R_{TH}$
Option D:	Depends upon source.
2.	A network consists of dependent current source with value $4V_X$. Which type of dependent source it is?
Option A:	Voltage Controlled Current Source
Option B:	Current Controlled Current Source
Option C:	Voltage Controlled Voltage Source
Option D:	Current Controlled Voltage Source
3.	Refer the following figure and determine current I_1. 
Option A:	0.5 A
Option B:	1 A
Option C:	2 A
Option D:	7 A
4.	Refer the following figure to find voltage Va.

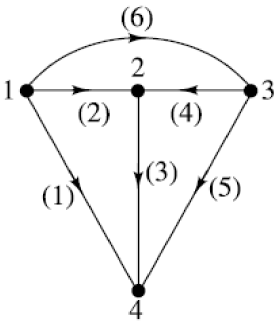
	
Option A:	2 V
Option B:	8 V
Option C:	18 V
Option D:	1 V
5.	Refer the following figure to find current Ia. 
Option A:	3 A
Option B:	2 A
Option C:	1 A
Option D:	0.5 A
6.	If the graph consists of 4 nodes and 6 branches then the number of twigs and number of links are ------ and ------ respectively.
Option A:	5, 5
Option B:	4, 4
Option C:	3, 4
Option D:	3, 3
7.	For the graph shown in figure, the number of rows in complete incidence matrix are -------.

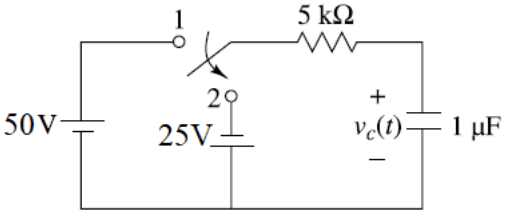
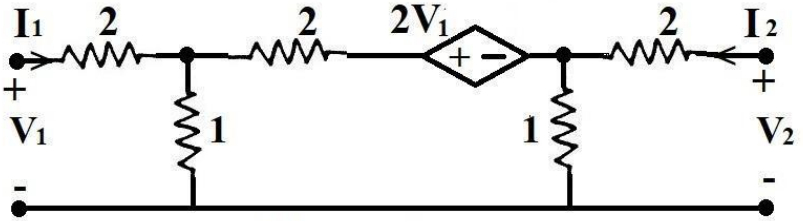
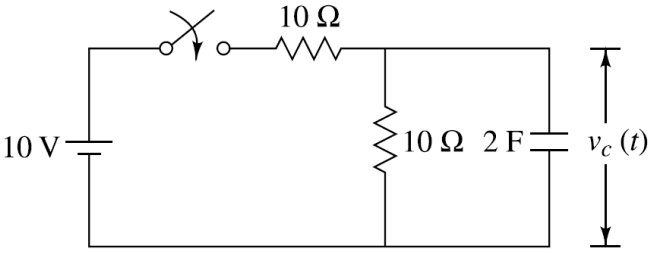
	
Option A:	5
Option B:	4
Option C:	3
Option D:	6
8.	The number of maximum possible trees for a graph is calculated by ------.
Option A:	N -1
Option B:	b – (n+1)
Option C:	b + n -1
Option D:	$\lvert A A^T \rvert$
9.	Which of the following is the correct generalized KCL equation in graph theory?
Option A:	$B.Z_b.B^T I_l = B.Vs - B.Z_b I_S$
Option B:	$QY_b\, Q^T.V_t = Q\, I_S - Q\, Y_b\, Vs$
Option C:	$B.Z_b.B^T I_l = - B.Vs$
Option D:	$QY_b\, Q^T.V_t = Q\, Y_b + Q\, I_S\, Vs$
10.	Refer the following figure and determine current i(t) in at $t=0^-$. 
Option A:	0 A
Option B:	1.25A
Option C:	1.1A
Option D:	1 A
11.	If u(t) signal is applied to the R-C network where R = 1 KΩ and C = 1 uF are connected in series. Calculate RC time constant (τ).
Option A:	3 uSec
Option B:	63.2 mSec

Option C:	1 mSec
Option D:	2 mSec
12.	Time constant of a series connected R-L network is -------.
Option A:	L/R
Option B:	R/L
Option C:	Product of R and L
Option D:	LS
13.	Which of the following represent Voltage across inductors in time domain?
Option A:	Lx$\frac{di(t)}{dt}$
Option B:	L$\int i(t).dt$
Option C:	Lxi(t)
Option D:	LxI(S)
14.	If the inductor and capacitor are connected in series then equivalent impedance is ---.
Option A:	1/LS + CS
Option B:	S(L+C)
Option C:	LS + 1/CS
Option D:	S^2(1+1/LC)
15.	Pole-zero location of the transfer function T(s) is shown in the following figure. Determine T(s). 
Option A:	H x $\frac{(S-1)(S-3)}{(S-2)(S-4)}$
Option B:	H x $\frac{(S-2)(S-4)}{(S-1)(S-3)}$
Option C:	H x $\frac{(S+1)(S+3)}{(S+2)(S+4)}$
Option D:	H x $\frac{(S+2)(S+4)}{(S+1)(S+3)}$
16.	A system is represented by transfer function T(s) = $\frac{18}{(S+3)(S+2)}$, the DC gain of this system is -------.
Option A:	18
Option B:	3

Option C:	2
Option D:	6
17.	Which among the following represents the precise condition of reciprocity for transmission parameters?
Option A:	AD-BC=1
Option B:	AB-CD=1
Option C:	AC-BD=1
Option D:	A=D
18.	A two port network is represented by the following equation. $I_1 = 65\ V_2 + 86\ I_2$ $V_1 = 43\ V_2 + 24\ I_2$ A and B parameters of the networks are given by ------- and ------ respectively.
Option A:	43, 24
Option B:	65, 86
Option C:	65, -86
Option D:	43, -24
19.	Determine Z_{11} and Z_{12} parameters of the following network. 
Option A:	$Z_{11} = 15\ \Omega$, $Z_{12} = -7\ \Omega$,
Option B:	$Z_{11} = 17\ \Omega$, $Z_{12} = 15\ \Omega$,
Option C:	$Z_{11} = 7\ \Omega$, $Z_{12} = 15\ \Omega$,
Option D:	$Z_{11} = 15\ \Omega$, $Z_{12} = 7\ \Omega$,
20.	Z parameter of two port network are $Z_{11} = 20\ \Omega$, $Z_{22} = 30\ \Omega$ and $Z_{12}=Z_{21}=10\ \Omega$. Then the network is -------.
Option A:	Reciprocal
Option B:	Non-Reciprocal
Option C:	Symmetrical
Option D:	Neither reciprocal nor symmetrical

Q2.	**Answer the following:**
A	**Solve any One** **10 marks each**
i.	For the circuit shown in below, find current through 3 Ω using superposition theorem. 
ii.	For the graph shown in figure find, 1) Complete incidence matrix 2) Reduced incidence matrix 3) f-Tie-set matrix and 4) f-Cutset matrix 
B	**Solve any two** **5 marks each**
i.	For the network shown in figure, plot poles and zeros function of $\frac{I0}{Ii}$. 
ii.	Derive condition of symmetry for Z parameters.
iii.	Calculate number of possible trees of following graphs.

Q3.	**Answer the following :**
A	**Solve any One** **10 marks each**
i.	In the network shown in figure, the switch was at 1st position for a long time and then it is moved to 2nd position at t=0. Determine Vc(t). 
ii.	Determine ABCD parameter for the network shown in figure. 
B	**Solve any One** **10 marks each**
i.	The switch in the network shown was opened for a long time, then it is closed at t = 0. Determine the voltage across the capacitor using Laplace. 
ii.	Write any five necessary conditions for driving point functions and transfer functions.

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Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	A
Q3.	C
Q4.	D
Q5.	B
Q6.	D
Q7.	C
Q8.	D
Q9.	B
Q10.	B
Q11.	C
Q12.	A
Q13.	A
Q14.	C
Q15.	C
Q16.	B
Q17.	A
Q18.	D
Q19.	D
Q20.	A